United States Environmental Protection Agency **Office of Research and Development**

National Exposure Research Laboratory
Research Abstract

Government Performance Results Act (GPRA) Goal # 4.5.2 (old # 30204)
Annual Performance Measure #226

Significant Research Findings:

Methods for Measuring Children's Exposures to Pesticides and Other Environmental Contaminants

Scientific Problem and Policy Issues	In August of 1996, Congress issued the Food Quality Protection Act (FQPA) mandating EPA to reassess pesticide tolerances for current-use pesticides. The FQPA mandates require that future risk assessments consider pesticide exposures from different exposure routes and media including residential exposures. In response to the FQPA mandates, the EPA's Office of Research and Development outlined a research strategy to address selected pesticide research priorities. EPA's research will provide better understandings of how individuals are exposed to pesticides, the magnitude of these exposures, and what measures may be needed to reduce future exposures.
Research Approach	The EPA's National Exposure Research Laboratory (NERL) conducted the Children's Total Exposure to Persistent Pesticides and Other Persistent Organic Pollutants (CTEPP) study to investigate the exposures that young children may have to pesticides and other persistent and non-persistent pollutants. This study was designed to produce high quality children's exposure data that could be used to address several of the FQPA mandates. During the study design phase, it became clear that new and/or refined sampling/analytical methods and approaches were needed to ensure the study produced the intended high quality data needed for conducting the aggregate exposure assessments. In response to these needs, NERL and its collaborators implemented a methods research program designed to improve the sensitivity and precision of the proposed study methods. Methods ranging from field screening methods (immunoassays) to the sophisticated and highly sensitive analytical techniques (LC/MS/MS and chiral separations) were developed for analyzing the target species in matrices such as air, dust and soil, wipes, food, urine (metabolites) and drinking water. All the enhanced methods were written in a standard operating procedure format and compiled into a single product for use in the EPA study and by others conducting similar exposure studies.
Results and Impact	The results of this methods research program represent a significant step in reducing uncertainties in children's exposure assessments. By using these tools, EPA and other exposure researchers can provide consistently-collected, high quality exposure data to OPP that can then be used in their FQPA mandated reassessments. The high quality exposure data generated with these methods also support the Agency's mission of safeguarding the environment and protecting human health.

Research Collaboration and Research Products

Methods were developed by EPA's NERL and EPA-funded contractors working in NERL's Human Exposure Research Program located at laboratories in Cincinnati, OH, Las Vegas, NV and Research Triangle Park (RTP), NC. The CTEPP study provided an opportunity for researchers to perform problem-driven research in support of a Congressional mandate to EPA's Office of Pesticide Programs (OPP).

The SOP collaborators on this document are:
Marsha Morgan (RTP)- CTEPP Task Order Project Officer and Principal Investigator, contractor developed methods;
Jeffrey Morgan (Cincinnati)- EPA food methods development;
Jeanette Van Emon (Las Vegas)- EPA immunoassays for parent compounds and their metabolites;
Andrew Lindstrom and Elin Ulrich (RTP)- EPA analytical methods (LC/MS/MS, chiral).

QA assistance was provided by Susan Lumpkin, Linda Porter and Elizabeth Betz in RTP.

Selected 2004 presentations and publications:

Morgan, J.N., Kauffman, P., Hieber, T.E., and Brisbin, J. Pesticide analytical methods to support duplicate-diet human exposure measurements. Presented at: 5th European Pesticide Residue Workshop, Stockholm, Sweden, June 13-16, 2004.

Brisbin, J., and Morgan, J.N. The determination of pyrethroid and pyrethrin insecticides in foods. To be presented at: 2004 Florida Pesticide Residue Workshop, Orlando, FL, July 18-21, 2004.

Morgan, M.K., Sheldon, L.S., Croghan, C., Jones, P., Wilson, N.K., Chuang, J.C., and Lyu, C. Levels of organophosphates and their degradation products in the homes, day care centers, and urine of 127 Ohio preschool children. To be presented at: International Society of Exposure Analysis, Philadelphia, PA, October 17-21, 2004.

Strynar, M.J., and Lindstrom, A.B. Summary of research on perfluorinated compounds at the U.S. Environmental Protection Agency's ORD/NERL/MDAB. Presented at: Center for Disease Control, Atlanta, GA, May 25, 2004.

Strynar, M.J., and Lindstrom, A.B. Overview of perfluorinated compound research at the U.S. Environmental Protection Agency's NERL/MDAB. Presented at: John Hopkins University Weekly Seminar, Baltimore, MD, March 22, 2004.

Wilson, N.K., Chuang, J.C., Lyu, C., Menton, R., and Morgan, M.K. Aggregate exposures of nine preschool children to persistent organic pollutants at day care and at home. Journal of Exposure Analysis and Environmental Epidemiology 13 (3):187-202 (2003). EPA/600/J-03/451.

Wilson, N.K., Chuang, J.C., Iachan, R., Lyu, C., Gordon, S.M., Morgan, M.K., Ozkaynak, H., and Sheldon, L.S. Design and Sampling Methodology for a Large Study of Preschool Children's Aggregate Exposures to Persistent Organic Pollutants in their Everyday Environments. *J. Expo. Anal. Environ. Epidemiol*. 2004: 14: 260-274.

Morgan, M.K., Sheldon, L.S, Croghan, C.W., Jones, P.A., Robertson, G.L., Chuang, J.C., Wilson, N.K., and Lyu, C.W. Exposures of preschool children to chlorpyrifos and its degradation product 3,5,6-trichloro-2-pyridinol in their everyday environments. Journal of Exposure Analysis and Environmental Epidemiology. (*accepted*).

Ulrich, E.M., Cummings, T., Garrison, A.W. Chiral Analysis of two indoor contaminants. Presented at Society for Environmental Toxicology and Chemistry Meeting, Austin, TX, November 12, 2003.

Future Research

NERL is committed to providing high quality exposure data to fill critical data gaps, replace default assumptions, and address EPA Program Office research needs. As residential-use pesticides are replaced, NERL will conduct research and develop the necessary tools for assessing exposures to the high-priority pesticides and persistent pollutants. NERL will compile a readily available toolbox of validated methods for use to address high priority exposure issues.

Contacts for Additional Information

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